

STUDIES IN THE CAPPARIDACEAE¹ VIII.
POLANISIA DODECANDRA (L.) DC.:

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FURTHER NOTES ON ITS TYPIFICATION.

In two studies in this series (Iltis 1954, 1958) it was maintained that the common American *Polanisia graveolens* Rafinesque should properly be called *P. dodecandra* (L.) DC., the latter based on *Cleome dodecandra* of Linnaeus's *Species Plantarum* (1753). However, in a recent generic review of the Caper family for the Southeastern United States, Ernst (1963: 90-91, footnote 6) casts serious doubts on the validity of this disposition, suggesting instead that the *C. dodecandra* L., based as it is on a description in the *Flora Zeylanica* (No. 242, p. 109), a work based in turn on Paul Hermann's Ceylon plants and drawings, is actually a hitherto unrecognized or misunderstood *Asiatic* species which should not be equated with the well-known American *Polanisia graveolens* Raf., the two being presumably totally different taxa. The present paper attempts to show that on the basis of the critical collections housed in London (and

¹[Ed.: Published as Capparidaceae rather than Capparaceae at the request of the author.]

²I am much obliged to the Botanical Society of America for a grant-in-aid to attend the Xth International Botanical Congress in Edinburgh, and thus be privileged to visit London and its herbaria, and to Dr. Wallace Ernst, U. S. National Herbarium, Smithsonian Institution, Washington, for the careful presentation of his arguments in correspondence. The staffs of the Linnaean and British Museum herbaria, especially J. E. Dandy, Keeper of Botany, N. K. B. Robson, and D. Hillcoat have been most generous with their help, as has been my colleague John W. Thomson and particularly Mr. Dandy for constructive and instructive criticisms of the manuscript. To them, my very sincerest thanks. This research was supported in part by Research Committee of the University of Wisconsin on Funds from the Wisconsin Alumni Research Foundation.

thus on somewhat different grounds than previously), and on a careful reexamination of the texts involved in this argument, my original conclusions must still be considered valid: namely that *Cleome dodecandra* L. and *Polanisia graveolens* Raf. are synonymous. Therefore, *P. dodecandra* (L.) DC. is still the correct name for the American taxon.

The original Linnaean citation (Sp. Pl. ed. 1, 2: 672) of *Cleome dodecandra* reads as follows: "*dodecandra*. 5. *Cleome floribus dodecandris, foliis ternatis. Fl. Zeyl. 242**". As was fully discussed in earlier studies (Iltis 1954, Ernst 1963), the two other following citations refer to other species.³ The star after *Flora Zeylanica* indicates the presence of a good description in that work. As to the origin of the species, he reported it as "*Habitat in Indiis*" meaning by that the warm regions of both Asia and America, as shown by the inclusion in synonymy of a Sloane plant from Jamaica.

As was pointed out previously (Iltis 1954), *the short description in the Flora Zeylanica is nevertheless a vivid and excellent one* (apparently having been made from living plants), and, with its reference to 8 stamens, 3-foliolate leaves, emarginate white petals, red pistil, unilateral gland and thick, hispid capsules, fits exactly only one taxon in the world, the American *Polanisia graveolens*. Thus, while Linnaeus' total conception of his species was confused if his diverse synonymy is considered, his own personal description of the plant in question is brilliantly clear.

³While the third and last of these Linnaean polynomials clearly refers to the New World *C. serrata* Jacq., the second polynomial (and reference to "Burm. Zeyl. 216, t. 100 f. 1") was thought to refer to perhaps *C. burmannii* W. and A., or to *C. rutidosperma* DC., though, truly, the drawing is unidentifiable. In the Geneva Herbarium are several "Herbier Burmann" collections, including one that matches this drawing — a depauperate miserable specimen, about 15 cm tall, with one hidden flower, labelled "*Cleome dodecandra*" [by Burmann?], a plant that conceivably could be a young *C. viscosa* or *C. aspera*, or [doubtfully], as Briquet had annotated it, *C. burmannii*. Whatever taxon this specimen belongs to, the plant is much too poor for Linnaeus to have used in drawing up the excellent *Flora Zeylanica* description, and can thus not be considered type material.

However, the *Flora Zeylanica* is not based on American collections, but on collections of plants and drawings made in Ceylon in ca. 1670-1677. But how can we reconcile a temperate American plant in tropical Ceylon? Fortunately, these drawings and plants of Hermann's are still preserved in the British Museum of Natural History, where they may be studied. They are thus of immense scientific value. In the *Flora Zeylanica*, to quote Stearn (1957:119), "... only phrase-names are used but, as pointed out by Trimen (1887), when dealing with Ceylon plants in the *Species Plantarum*, 'Linnaeus was careful to quote under them the number of the *Fl. Zeylan.*, and thus the specimens of Hermann's herbarium become types for many of Linnaeus's species . . . especially as the large majority of the species in Hermann's herbarium are unrepresented in Linnaeus's own collection.' " Thus, when typifying a species described in the *Flora Zeylanica*, one must consult the Hermann herbarium!

Recently an opportunity presented itself to make a search for the type of *Cleome dodecandra*, and, with the generous help of Miss D. Hillcoat, the four volumes of the Hermann herbarium were examined page by page, specimen by specimen. Of the *Cleome* species cited in the *Flora Zeylanica*, the following were found to be represented by specimens:

- C. gynandra*, *Fl. Zeyl.* No. 239 (in vol. I, p. 1, and vol. III, p. 7) ;
- C. viscosa*, *Fl. Zeyl.* No. 241 (in vol. I, p. 75, and vol. III, p. 2) ;
- C. monophylla*, *Fl. Zeyl.* No. 243 (in vol. I, p. 52 and 57, and vol. III, p. 2).

There were no specimens for *C. icosandra*, *Fl. Zeyl.* No. 240, and, more importantly, there were none for *C. dodecandra* *Fl. Zeyl.* No. 242! Next, an examination of Hermann's *Icones* volume showed but two *Cleome* illustrations, one on page 421 (numbered 242 — was this number entered there

by Linnaeus.⁴), the other on page 24, neither of which could be *C. dodecandra*. Both appear to represent normal plants of *Cleome aspera*, the latter figure (p.24) but a small-scale copy of the first, and matching very well such *Cleome aspera* collections as *Beddome 203* from Madras, India (BM!) or the *C. aspera* type (K!). Thus, neither Hermann's drawings nor his herbarium contain any material referable to Linnaeus's *Cleome dodecandra*. Furthermore, we can follow neither Trimen (1887:146), who equated No. 242 of the *Flora Zeylanica* (i.e. *C. dodecandra*, with the first of these drawings (No. 242), as "*C. viscosa* L. var.", nor Ernst (1963), who, following Trimen, suggests that this drawing should be taken as a type of *C. dodecandra*. For these drawings, both evidently of the same plant, represent *C. aspera*, a 6-staminate, glandless, slender-fruited species, and in no way agree with Linnaeus's excellent descriptions of *C. dodecandra*. As a matter of fact, how could Linnaeus have obtained all this detail, as well as flower and pistil color, from this simple drawing?

At this point Mr. Dandy very kindly (and literally) came to the rescue, for in examining the *Flora Zeylanica* text (p. 109) he *immediately noted a very significant omission in the Cleome dodecandra description*, one that neither I nor Ernst was aware of: namely that *Linnaeus does not cite (as he usually does in the Flora Zeylanica) any collection or plate of Hermann's Musaeum Zeylanicum following the description of C. dodecandra!* This can only mean that *Linnaeus did not have a Hermann specimen in front of him when he drew up this description*, but rather some plant of different origin, a plant which he for some reason must have believed should belong in a book on Ceylon plants. Very possibly, he equated one of his garden plants with Burmann's Ceylon drawing which, being based on a Ceylon plant, was to be included in *Flora Zeylanica* whether or not

⁴According to Trimen (1887:130), "In the [Hermann] herbarium itself he [Linnaeus] has added to Hermann's labels a reference to the number of the species in his own 'Flora Zeylanica.'"

Hermann had collected it. In any case, he must have had his reasons, for the inclusion in the *Flora Zeylanica* of plants other than those collected by Hermann in Ceylon is a rare (though not unknown) occurrence. That an error on the part of Linnaeus is involved here was deduced earlier on somewhat different grounds (Iltis 1954: 67, footnote).

Since Linnaeus evidently had a plant available when writing the description of *C. dodecandra*, we are now again forced to look for a specimen, and the logical place to seek is in the Linnaean Herbarium. There, the one plant that clearly fulfills all requirements is sheet 850.12 (Savage 1945). In my earlier studies I could only guess at the identity of this plant from the poor photograph then available. Now, however, after an examination of the actual specimen, there is no doubt that this plant is indeed the same as *Polanisia graveolens* Raf., with the emarginate petals, and at least 8 stamens (inflorescence very young and not vigorous) clearly visible.

Since Linnaeus mentions "*capsula crassa, hispida*", he must have had in hand (or in memory) the characteristically thick and hispid-fruited plants of this species, probably from his Uppsala garden, where the species was evidently in cultivation, the specimen in question (850.12) having a small tag glued to its stem that reads "H. U. 12 andr" [*Hortus Upsaliensis dodecandra*]. This cultivated plant, therefore, we must take as the type of *Cleome dodecandra* L.: it is clearly the only specimen that agrees (and then exceedingly well) with the original description, and is furthermore labelled by that name with a tag that we have reason to believe is contemporaneous with the publication of the *Flora Zeylanica* (1747) or earlier. As to the country of origin, we can only guess the Northeastern United States or adjoining Canada. Linnaeus evidently did not know the source, but believed it to be identical to that of the Burman and Boerhaave plants from tropical Asia cited in *Flora Zeylanica*.

Complicating this story are the whole series of errors that occurred in the labelling (contemporaneously or subse-

quent to 1753?) of the *Cleome* collections in Linnaeus's herbarium as well as in his texts. Thus: 1) he was mistaken in later writing on sheet 850.12 the name "*viscosa*" (though the older tag label says "H. U. 12 andr"!). Whoever scribbled this reidentification on the bottom of this sheet (and presumably it was Linnaeus himself), he must have suffered a *lapsus calami*, for this specimen is so unlike any of the other sheets labelled "*viscosa*" that the identification appears absurd; 2) he was mistaken when he wrote "*dodecandra*" on sheet 850.14 which is clearly *C. viscosa*, and which in every respect matches the other *C. viscosa* sheets in the Linnaean Herbarium (e.g. 850.11, 850.13); 3) he was mistaken when he wrote "*dodecandra*" on sheet 850.7, which carries a good specimen of *C. serrata* Jacq. (*C. polygama* L.), only later to scratch this name out, and to substitute the correct name "*polygama*" after it; 4) lastly he made the curious error of misquoting the word *octandris* as *dodecandris* when copying the original definition (polynomial) of No. 242 from the *Flora Zeylanica* to the *Species Plantarum*, and then taking the specific epithet *dodecandris* from this miswritten adjective. It is an error easy to understand, however, for the young specimen (850.12) that he studied, as young specimens of that species are apt to, had 8 stamens, while no doubt on the somewhat older plants in his garden he observed the commoner higher stamen number, hence the later and very descriptive epithet "*dodecandra*."

SUMMARY

Cleome dodecandra L., though published in *Flora Zeylanica*, is based on cultivated American material grown in *Hortus Upsaliensis* by Linnaeus and now preserved in the Linnaean Herbarium. This material is conspecific with *Polanisia graveolens* Raf. The correct name of this taxon is, therefore, as was maintained earlier (Iltis 1954) on less certain evidence, *Polanisia dodecandra* (L.) DC., or, if retained in *Cleome*, *C. dodecandra* L.

POSTSCRIPT

THE SUBSPECIES OF POLANISIA DODECANDRA.

A reinterpretation of evidence presented earlier (Iltis 1958, esp. Figs. 6 and 9-21), and observations of some of these taxa in the field, demands that the Mexican and Southwestern *P. uniglandulosa* (Cav.) DC. should be considered a perfectly distinct species on morphological as well as geographic grounds, and not as a subspecies of *C. dodecandra*,⁵ though the two are evidently closely related. On the other hand, *P. dodecandra* and the western *P. trachysperma* behave like geographical subspecies, the former evidently a taxon of more recent evolutionary origins, restricted to the glaciated northeastern United States and southern Quebec, but intergrading with the latter in a broad belt from Missouri to Minnesota. The species is therefore composed of *P. dodecandra* (L.) DC. ssp. *dodecandra* and *P.d.* ssp. **trachysperma** (T. & G.) Iltis **stat. nov.** (= *P. trachysperma* T. & G. Fl. N. Am. 1: 669. 1840).

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⁵I am obligated to Dr. W. L. Brown, Jr., Museum of Comparative Zoology, Harvard University, for calling some of the pertinent reasons for this interpretation to my attention.

POLANISIA DODECANDRA IN NEW HAMPSHIRE¹

Polanisia dodecandra (L.) D. C. of the Capparaceae, not previously recorded in New Hampshire, has been found growing in Durham, New Hampshire. In New England, this species was reported only from the Lake Champlain region of Vermont by Bean, Hill, and Eaton (*Rhodora*, 63:53, 1961). The records, however, are based essentially on specimens in the Harvard Herbaria. In Connecticut, Weatherby reported it from the banks of the Hockanum River in East Hartford, and Driggs, from the vicinity of the Connecticut River at Hartford. These reports are cited in *The Catalogue of Flowering Plants and Ferns of Connecticut*, State of Connecticut Geological and Natural History Survey, Bull. 14:211, 1910. I have been unable to locate any specimens collected in Connecticut in the herbaria at the University of Vermont, University of Connecticut, Yale University, and the Connecticut Botanical Society.

I found the plants growing in crushed granitic rock of the B&M railroad bed about two hundred yards north of the old Durham depot, on September 4, 1965. The sandy soil beneath the rock was fairly moist despite a dry superficial appearance.

On September 23, 1965, Dr. A. R. Hodgdon, Mr. Wendell Berry, Jr., and I examined the station more closely and estimated that between two and three thousand plants were growing in an area about three hundred feet long and thirty feet wide. The plants ranged in height from less than an inch to two feet. The collections from this station have been deposited in the University of New Hampshire Herbarium and in the New England Botanical Club Herbarium at Harvard University, Cambridge, Massachusetts

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¹I wish to acknowledge the assistance of the following: Mr. Frank Seymour, Mr. Leopold Charette, Dr. George Torrey and Dr. James Neale. Their help in my search for herbarium specimens is much appreciated.

CHROMOSOME NUMBERS IN VERNONIA (COMPOSITAE)

S. B. JONES, JR. AND W. H. DUNCAN

The genus *Vernonia* is a member of the tribe Vernonieae of the Compositae, which is not as well known cytologically as the other tribes in the family. It is the largest genus in the tribe with about 1000 species of temperate and tropical America, Asia and Africa. The members of the genus are herbs or shrubs, and nearly all are perennial. The North American species of *Vernonia* were monographed by Gleason (1906) who also treated them in "North American Flora" in 1922. Chromosome numbers reported in *Vernonia* are summarized in Table 1. This list includes both Old and New World species. Gametic numbers of 9, 10, 16, 17, 18, 20, and 27 are indicated. The first known determination was in 1933 by G. W. Bohn, who counted $n=18$ in *V. baldwinii* (personal communication to the senior author, April, 1962). Grant (1953) suggested that the basic number for the genus may be 9 based on his record for *V. cinerea*, a species considered by Gleason to be one of the more primitive *Vernonia*. Additional work is needed, however, to establish Grant's hypothesis firmly. Hunter (1964), in a recent paper, has presented chromosome counts of $n=17$ for seven species and one hybrid. In connection with taxonomic studies in the genus, the chromosome numbers were obtained for 13 taxa and these are reported in this paper. Meiotic chromosome counts were obtained from pollen mother cell squashes. Buds were collected in the field or from transplants, and killed and fixed in modified Carnoy's (4 parts chloroform: 3 parts absolute alcohol: 1 part glacial acetic acid). All material was squashed and stained in acetocarmine. Voucher specimens were made and deposited in the University of Georgia Herbarium. Camera lucida drawings and photomicrographs were used to record the observations which were made from fresh mounts.